

Plants Now "Text Message" Thirst

For best growth, each plant species has a fairly narrow optimal range of internal temperatures. When leaf temperatures go above the upper limit and stay there too long, a plant needs water for both cooling and hydration. Now an automated drought-monitoring system has been developed that allows farmers to receive text messages on their cell phones from plants that "say" whether or not they're "thirsty."

Developed with Accent Engineering, Inc., of Lubbock, Texas, the SmartCrop™ system relies on battery-operated infrared thermometers placed in irrigated fields to monitor leaf temperatures and relay the information to a computerized base station. Hooking up a cell phone modem to the station allows downloading of temperature data to a personal computer. The modem can also send text messages to a farmer's cell phone. SmartCrop™ allows farmers to choose the time-temperature threshold at which they want to receive an alert. *James R. Mahan, USDA-ARS Plant Stress and Germplasm Development Research Unit, Lubbock, Texas; phone (806) 749-5560, e-mail james.mahan@ars.usda.gov.*

Potassium-Rich Foods Preserve Muscle Mass

The typical American diet generates tiny amounts of acid each day. As people age, they develop a mild metabolic acidosis that increases slowly over time and appears to trigger a muscle-wasting response. So researchers looked at links between lean body mass and diets relatively high in potassium-rich, alkaline-residue-producing fruits and vegetables to see whether these foods could influence lean tissue mass. They conducted a cross-sectional analysis on a subset of nearly 400 male and female volunteers aged 65 or older who had completed a 3-year osteoporosis-intervention trial.

The volunteers' physical activity, height and weight, and percentage of lean body mass were measured at the start

of the study and at 3 years. Their urinary potassium was measured at the start of the study, and their dietary data was collected at 18 months.

Regression model results indicated that volunteers with potassium-rich diets could expect to have 3.6 more pounds of lean tissue mass than volunteers with half the higher potassium intake. According to the study's authors, this almost offsets the 4.4 pounds of lean tissue that healthy men and women 65 and over typically lose in a decade. *Bess Dawson-Hughes, Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, Massachusetts; phone (617) 556-3064, e-mail bess.dawson-hughes@tufts.edu.*

Mini-JET Test Predicts Erodibility

All across the United States, earthen embankments—including levees and dams—help keep water within bounds, especially in rainy periods. The structures' efficacy and safety depend in large part on resistance to erosion, which in turn hinges on the soil materials used in their construction. To measure erodibility of soil materials in constructed embankments, earthen spillways, and stream channels, hydraulic engineers developed a tool called a Jet Erosion Test, or JET. Now the researchers have built a scaled-down version that enables them to study—in the laboratory—the influence of compaction on erosion processes, including soil water content and mechanical forces needed to increase soil density.

For example, recent lab-scale JET tests on a silty sand soil and a silty clay soil showed that both soil compaction and water content have a significant impact on erodibility. While higher compaction increased erosion resistance, soil texture and water content at the time of compaction affected resistance as much—or more.

When the team compared lab findings with large-scale field controls, they found that the lab-scale JET results provided accurate measurements, even in soil samples as small as 10 centimeters in diameter. Scientists think it may be possible to

use these findings to construct earthen embankments that are many times more erosion-resistant than those built in the past. *Gregory J. Hanson and Sherry L. Hunt, USDA-ARS Hydraulic Engineering Research Unit, Stillwater, Oklahoma; phone (405) 624-4135, e-mail greg.hanson@ars.usda.gov, sherry.hunt@ars.usda.gov.*

Hairy Vetch Boosts Tomato Phytonutrients

Members of the *Vicia* genus known as "hairy vetch" are viny, moderately winter-hardy legumes that are often grown to stabilize roadbanks or to serve as forage for grazing animals. Since they fix atmospheric nitrogen, they are a rich source of that critical plant nutrient.

Now research has shown that planting tomatoes in fields of killed and rolled hairy vetch, which serves as a mulch, activates some of the metabolic pathways and genes that make tomato plants more vigorous—and their fruit more tasty and nutritious. The effect is similar to that obtained by inserting the *ySAMdc* gene into tomato plants, which is known to increase production of polyamines.

How the fruit of regular tomatoes grown in hairy vetch mulch becomes so nutritionally similar to fruit produced by *ySAMdc*-modified tomatoes isn't yet understood. But when both modified and unmodified tomatoes were grown in hairy vetch mulch, a buildup of amino acids, choline, and other nutrients and antioxidants was seen to occur in the fruit, and the *ySAMdc*-modified tomatoes contained even more nutrients—and at much higher levels—than unmodified ones.

Researchers think that the polyamines may act as signaling molecules and steer metabolic pathways so fruits produce more phytonutrients.

This collaborative investigation is being done with scientists at Purdue University and the Italian National Research Agency. *Autar K. Mattoo, USDA-ARS Sustainable Agricultural Systems Laboratory, Beltsville, Maryland; phone (301) 504-6622, e-mail autar.mattoo@ars.usda.gov.*